



283-4 CIP

**CIGARETTE**

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**BACKGROUND OF THE INVENTION**

5 This application is a continuation in part of U.S. Application Serial No.  
09/522,877 filed on March 10, 2000.

This applications asserts priority to European Application No. 99105581.5  
filed on March 13, 1999. The specification of European Application No. 99105581.5  
is incorporated by reference.

10 The invention is based on the problem of avoiding spotting on the wrappers of  
cigarettes.

The buyers of cigarettes consider the spotless white appearance of a cigarette  
as an indication of quality. Even if this opinion is not particularly correct - in hot,  
humid climates cigarettes can show discoloration even after a short period of storage,  
which does not affect the smoke flavour - manufacturers have to focus upon market  
15 expectations.

Spotting of cigarette paper can be explained in that dissolved substances  
contained in the tobacco can penetrate the paper at the points of contact between the  
paper and the tobacco particles, as said paper is both porous and hydrophilic.

20 It would be conceivable to reduce spotting on cigarette paper in that said paper  
is coated with any substances that would make the paper completely impervious.  
Such coatings have been proposed in order to effect rapid extinguishing of discarded  
cigarettes. In order to be able to control the content of different substances contained  
in the smoke, however, the cigarette manufacturer is generally interested in a certain  
degree of air permeability of the cigarette paper. The problem is consequently to, on  
25 the one hand, keep the paper permeable for air, and on the other hand to reduce the  
permeability for dissolved cigarette ingredients.

For solving the problem, US-A 5,143 099 proposed to form the cigarette wrapper using two layers of paper, wherein the inner wrapper is provided with a very high degree of permeability, so that the overall permeability remains sufficient. In this context, the possibility of making the inner wrapper water repellent by adding 0.5% alkyl ketene dimer was mentioned.

### **SUMMARY OF THE INVENTION**

In comparison with the prior art described, the object of the invention is to make the use of two layers of paper superfluous, this being by means of an impregnating agent that is harmless and changes the smoke flavour as little as possible.

It was unexpected that providing the cigarette with a wrapper that comprises a layer of paper with water repellent impregnation made from a cellulose derivative, in particular of ethyl cellulose, would lead to a solution of the object. EP 0 419 981 does describe such a cigarette, in which, however, the air permeability is below 5 Coresta units.

### **DETAILED DESCRIPTION OF INVENTION**

The invention is based on the recognition that the impregnation can be sufficiently thin to retain the desired air permeability, if it is applied in several layers. It is thus provided according to the invention that the cellulose derivative is applied in several layers in order to obtain an air permeability in the wrapper of at least 20, preferably 50 Coresta units.

Different cellulose derivatives per se satisfy the physical criteria required with respect to air permeability and water permeability in the impregnated paper, for example, sufficiently highly derived cellulose ether and cellulose ester (for example, nitrocellulose). Ethyl cellulose is preferred, however, as it is harmless - it complies with the German regulations - and makes practically no change to the smoke flavour.

Further details of the invention will be discussed hereinafter with reference to comparative tests.

5 In a preferred embodiment, a cigarette paper wrapper is provided for impregnating with a cellulose derivative. The cellulose derivative can be ethyl cellulose. A first layer of the cellulose derivative is applied to the cigarette paper wrapper. The cellulose derivative can be applied using a coating roller in a gravure process, however, other coating methods can be used. After the first layer is applied, a second layer of cellulose derivative is applied and allowed to dry. Additional layers of cellulose derivative can be applied if needed. The user can allow the first layer of  
10 cellulose derivative to dry before applying the second layer of cellulose derivative.

An advantage of applying the cellulose derivative in multiple layers is that a more even and uniform coating of the paper is achieved. Also, the application of the cellulose derivative in multiple steps decreased the likelihood of having “pinholes” of uncovered areas on the paper, since they are covered by successive layers of the  
15 cellulose derivative.

Cigarette papers with a substance of  $26 \text{ g/m}^2$  were coated, in a gravure process by means of a coating roller, with cellulose azetopropionate (CAP) or with cellulose azetobutyrate (CAB) or with ethyl cellulose (EC). The amount applied was approximately  $0.7 \text{ g/m}^2$ . Cigarettes were manufactured with the cigarette paper  
20 manufactured in this way.

In order to test their spotting tendency, the cigarettes were stored packaged and unpackaged at either  $20^\circ\text{C}$  and 60% relative humidity or  $30^\circ\text{C}$  and 80% relative humidity. Examination for spotting (in each case 100 cigarettes) was carried out immediately after production and after 24 and 48 hours. An evaluation was made  
25 according to spot size and number, and the results were converted, by means of weighting, into a point system.

The evaluation produced the following results:

Coating with 0.7 g EC            572 points

Coating with 0.7 g CAP           223 points

Coating with 0.7 g CAB           77 points

5            Although ethyl cellulose coated paper showed a comparatively strong  
tendency for spotting (large number of spots), the further development was carried out  
with this material, as an undesired change in the smoke character was determined with  
CAP and CAB. Even with the use of EC coated paper, a significantly lower spotting  
10           frequency was nevertheless determined, compared with uncoated paper. After  
approximately one month, however, the cigarettes manufactured using paper coated  
with EC showed no dark spots, whereas large yellow spots appeared on those with  
uncoated paper. This is probably because coloring agents penetrate the paper through  
flaws in the coating, the spreading of which agents is prevented by the coating. Due  
to these observations, the tests were repeated with twice-coated paper, that is to say  
15           with cigarette paper loaded with  $1.4 \text{ g/m}^2$ . With this, the spotting tendency decreased,  
according to the method of calculation described hereinabove, to 56 points, that is to  
say it reduced by the power of 10 compared to the single coating. This excellent  
result was confirmed in long-term testing.

20           It is to be emphasized in particular that the success described was obtained  
even though the porosity of the paper, which was 50 Coresta units before coating, was  
still 20 Coresta units after coating. Initial tests with more porous paper as the starting  
material confirm that even with a final porosity of 50 Coresta units, the radical  
reduction in the tendency to spot, according to the invention, was obtained. (One  
Coresta unit (CU) indicates how many  $\text{cm}^3$  of air flow per minute through an area of 1  
25            $\text{cm}^2$  of paper under pressure of a 10 cm head of water.)